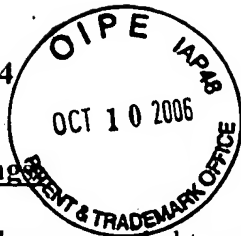


Application No.: 10/820,054



Amendments to the Drawings

Figures 6 and 7 have been amended to properly list the anode material for Comparative Example 14 as GRAPHITE. As disclosed in the specification at page 44, lines 21-24, graphite was used instead of boron-added graphite in Comparative Example 14. Amended Figures 6 and 7 are attached to this response and are labeled Replacement Sheet.

REMARKS

This Amendment is filed in response to the Office Action dated July 10, 2006. For the following reasons the application should be allowed and the case passed to issue. No new matter is introduced by this amendment. Support for the amendment to Figs. 6 and 7 is found in the specification at page 44, lines 21-24.

Claims 1-17 are pending in this application. Claims 1-17 are rejected. Claims 1, 3, and 6 have been amended in this response.

Claim Rejections Under 35 U.S.C. § 102

Claims 1-6, 8, 10, 12, 14 and 16 were rejected under 35 U.S.C. § 102(e) as being anticipated by Yamamoto et al. (U.S. Pat. No. 6,890,685). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention, as claimed, and the cited prior art.

An aspect of this invention, per claim 1, is an anode electrode for a secondary battery having a cathode and an anode for releasing and receiving the same kind of metal ion therebetween comprising an anode layer including boron-added carbon. The anode layer has a thickness of 30 μm or less.

Another aspect of this invention, per claim 4, is an anode electrode for a secondary battery having a cathode and an anode for releasing and receiving the same kind of metal ion therebetween, comprising an anode layer including carbonaceous material. The anode layer has a thickness less than 1 μm .

Another aspect of the invention, per claim 6, is a lithium ion secondary battery comprising an anode electrode including an anode layer having boron-added carbon. The anode layer has a thickness of 30 μm or less. The battery further comprises a cathode electrode

including a cathode layer and an electrolyte interposed between the cathode electrode and the anode electrode.

Another aspect of the invention, per claim 12, is a lithium ion secondary battery comprising an anode electrode including an anode layer having carbonaceous material, a cathode electrode including a cathode layer; and an electrolyte interposed between the cathode electrode and the anode electrode. The anode layer has a thickness less than 1 μm .

The Examiner asserted that Yamamoto et al. disclose an anode which has a multi-layer structure comprising: a first layer (2a) containing carbon as a main component; and a second layer (3a) as a main component containing a lithium-occluding material film, the film capable of occluding lithium more than a theoretical lithium-occlusion capacity for carbon.

The first layer (2a) of the Yamamoto et al. anode contains carbon as a main component, and has a total thickness of 5 to 1000 μm (column 6, lines 57-58). The carbon is capable of occluding Li. Carbons disclosed by Yamamoto et al. include: graphite, fullerene, carbon nanotube, DLC, amorphous carbon, hard carbon and mixtures thereof. The carbon anode (2a) may be formed by mixing the carbon material with a conductive material such as carbon black and vapor grown carbon fiber (VGCF), a binder such as polyvinylidene fluoride and a solvent such as N-methyl-2-pyrrolidone (NMP) to give a paste, which is then applied on the current collector (1a) and dried (column 7, lines 11-23).

The second layer (3a) of the Yamamoto et al. anode contains the lithium-occluding material comprising at least one element selected from the group consisting of Si, Ge, Sn and Pb, i.e., a material containing a group IVb element other than carbon (column 6, lines 35-38). Further, the second layer (3a) has a total thickness of 0.1 to 500 μm (column 6, lines 58-59).

Furthermore, the second layer (3a) may be doped with boron, phosphorous, arsenic or antimony to reduce a specific resistance (column 7, lines 53-56).

Yamamoto et al., however, do not anticipate the claimed anode electrode and lithium ion secondary battery because Yamamoto et al. do not disclose the anode layer which includes boron-added carbon and has a thickness of 30 μm or less, as required by claims 1 and 6; and do not disclose the lithium ion secondary battery wherein the anode layer has a thickness of less than 1 μm , as required by claims 4 and 12.

As shown in FIG 6 of the present application, when using the anode layer which includes boron-added carbon and has a thickness of 30 μm or less, or using the anode layer which includes carbonaceous material and has a thickness less than 1 μm , deposition of lithium metal can be prevented.

Further, as shown in FIG. 7, when using the anode layer which includes boron-added carbon and has a thickness of 30 μm or less, or using the anode layer which includes carbonaceous material and has a thickness less than 1 μm , an averaged maintenance ratio of capacity can be increased. In fact, it is clearly evident that cycle life exceeding that of a conventional battery is obtained by using the claimed anode electrode.

The factual determination of lack of novelty under 35 U.S.C. § 102 requires the disclosure in a single reference of each element of a claimed invention. *Helifix Ltd. v. Blok-Lok Ltd.*, 208 F.3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994); *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 399, 36 USPQ2d 1101 (Fed. Cir. 1995); *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992); *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d

1051 (Fed. Cir. 1987). Because Yamamoto et al. do not disclose the anode layer which includes boron-added carbon and has a thickness of 30 μm or less, as required by claims 1 and 6; and do not disclose the lithium ion secondary battery wherein the anode layer has a thickness of less than 1 μm , as required by claims 4 and 12, Yamamoto et al. do not anticipate claims 1, 4, 6, and 12.

Applicant further submits that Yamamoto et al. do not suggest the claimed anode electrode and lithium ion secondary battery.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 7 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Hossain (U.S. Pat. No. 5,595,839). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Yamamoto et al. and Hossain do not suggest the claimed lithium ion secondary battery because Hossain does not cure the deficiencies of Yamamoto et al. Hossain does not suggest the anode layer which includes boron-added carbon and has a thickness of 30 μm or less, as required by claim 6; and does not suggest the anode layer having a thickness of less than 1 μm , as required by claim 12.

Claims 9 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Izuchi et al. (U.S. Pat. No. 6,902,848). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Yamamoto et al. and Izuchi et al. do not suggest the claimed lithium ion secondary battery because Izuchi et al. do not cure the deficiencies of Yamamoto et al. Izuchi et al. do not suggest the anode layer which includes boron-added carbon and has a

thickness of 30 μm or less, as required by claim 6; and do not suggest the anode layer having a thickness of less than 1 μm , as required by claim 12.

Claims 11 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Nemoto et al. (U.S. Pat. No. 6,368,750). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Yamamoto et al. and Nemoto et al. do not suggest the claimed lithium ion secondary battery because Nemoto et al. do not cure the deficiencies of Yamamoto et al. Nemoto et al. do not suggest the anode layer which includes boron-added carbon and has a thickness of 30 μm or less, as required by claim 6; and does not suggest the anode layer having a thickness of less than 1 μm , as required by claim 12.

The dependent claims are allowable for at least the same reasons as the independent claims from which they depend and further distinguish the claimed invention.

In view of the above amendments and remarks, Applicant submits that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

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To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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